

# NASA TECH BRIEF

## NASA Pasadena Office



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### Compact Laser Through Improved Heat Conductance

#### The problem:

Lasers generating pulse outputs of 10 joules or more are usually heavy and bulky. Much of this is due to currently-used cooling arrangements. Typically, large quantities of air or water are passed across the hot laser elements. The elements are made large and are spaced widely apart to allow sufficient contact with cooling fluids.

#### The solution:

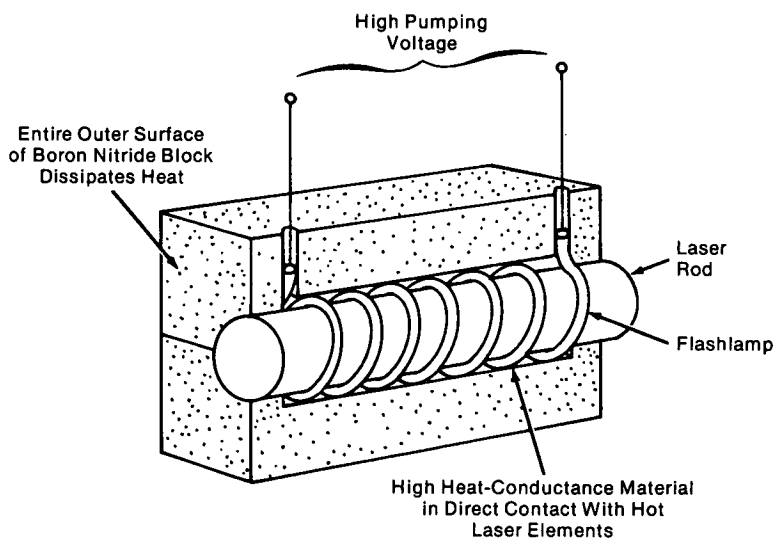
A 16-joule-pulse laser has been developed in which a boron nitride heat-conductor enclosure is used to remove heat from the elements. The enclosure is much smaller and lighter than the systems in which cooling fluids are used. The complete laser unit weighs 11.3 lb (5 kg) and has a volume of 230 in.<sup>3</sup>

(3,770 cm<sup>3</sup>). The unit has been converted to a Q-switched laser with more than 4.5 joules output per pulse.

#### How it's done:

The boron nitride enclosure as shown is machined to accept a laser flashlamp and rod. There are two blocks used which are machined to have close contact with the elements. One block includes passageways drilled to accommodate high-voltage leads to the lamp. The blocks enclose the elements from top and bottom.

The enclosure was tested for its cooling effectiveness. Results show that after five hundred 16-joule pulses the elements had no deterioration.



Laser Elements Cooled by Boron Nitride Block

(continued overleaf)

**Note:**

Requests for further information may be directed to:

Technology Utilization Officer  
NASA Pasadena Office  
4800 Oak Grove Drive  
Pasadena, California 91103  
Reference: TSP75-10176

**Patent status:**

Title to this invention has been waived under the provision of the National Aeronautics and Space Act [42 U.S.C. 2457(f)], to the California Institute of Technology, Pasadena, California 91109.

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